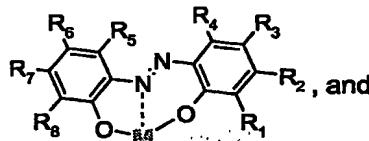


- 60 -

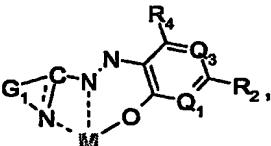
What is claimed is:

1. An optical recording medium comprising a substrate, a reflecting layer and a recording layer, wherein the recording layer comprises a compound of formula $[L_1M^{r=4}L_2]_o[A^{m-}]_p[Z^{n+}]_q$ (I), $[L_1M^{r=3}L_3]_o[A^{m-}]_p[Z^{n+}]_q$ (II) or $[L_3M^{r=2}L_4]_o[A^{m-}]_p[Z^{n+}]_q$ (III),
5 which compound of formula (I), (II) or (III) may also be in a mesomeric or tautomeric form, wherein

L_1 and L_2 are each independently of the other



L_3 and L_4 are each independently of the other



M indicating the position of $M^{r=4}$, $M^{r=3}$ or $M^{r=2}$ in (I), (II) or (III), respectively;

- 10 G_1 is $R_5=C_1=Q_2C_2=Q_3N_3$, $R_6=C_1=Q_4C_2=Q_5N_3$, $Q_6=C_1=Q_4N_3$, $Q_7=C_1=Q_6N_3$, $Q_8=C_1=Q_7N_3$ or $Q_9=C_1=Q_8N_3$;

Q_1 is CR_1 or N , Q_2 is O , S , NR_{10} or $Q_5=Q_8$, Q_3 is CR_3 or N , Q_4 is O , S , NR_{10} or $Q_7=Q_8$, Q_5 is CR_5 or N , Q_6 is CR_6 or N , Q_7 is CR_7 or N , Q_8 is CR_8 or N , and Q_9 is O , S , NR_{10} or $Q_6=Q_8$, preferably either Q_1 is CR_1 and Q_3 is CR_3 or Q_1 and Q_3 are both N , and/or Q_8 in $Q_5=Q_8$, $Q_6=Q_8$ or $Q_7=Q_8$ is in the β -position relative to the

- 15 nitrogen atom of G_1 , and in the case of tautomers Q_1 may also be NR_1 and/or Q_3 may also be NR_3 ;

R_1 , R_3 , R_4 , R_5 , R_6 , R_7 and R_8 are each independently of the others H , halogen, OR_9 ,

- 61 -

SR₉, NR₁₀R₁₅, NR₁₀COR₁₁, NR₁₀COOR₉, NR₁₀CONR₁₂R₁₃, NR₁₀CN, OSiR₁₀R₁₁R₁₄, COR₁₀, CR₁₀OR₁₁OR₁₄, NR₉R₁₂R₁₃⁺, NO₂, CN, CO₂⁻, COOR₉, SO₃⁻, CONR₁₂R₁₃, SO₂R₁₀, SO₂NR₁₂R₁₃, SO₃R₉, PO₃⁻, PO(OR₁₀)(OR₁₁); C₁-C₁₂alkyl, C₂-C₁₂alkenyl, C₂-C₁₂alkynyl, C₃-C₁₂cycloalkyl, C₃-C₁₂cycloalkenyl or C₃-C₁₂heterocycloalkyl each

5 unsubstituted or mono- or poly-substituted by halogen, OR₉, SR₉, NR₁₀R₁₅, NR₁₀COR₁₁, NR₁₀COOR₉, NR₁₀CONR₁₂R₁₃, NR₁₀CN, OSiR₁₀R₁₁R₁₄, COR₁₀, CR₁₀OR₁₁OR₁₄, NR₉R₁₂R₁₃⁺, NO₂, CN, CO₂⁻, COOR₉, SO₃⁻, CONR₁₂R₁₃, SO₂R₁₀, SO₂NR₁₂R₁₃ and/or SO₃R₉; or C₇-C₁₂aralkyl, C₆-C₁₀aryl or C₅-C₉heteroaryl each unsubstituted or mono- or poly-substituted by R₁₀, halogen, OR₉, SR₉, NR₁₀R₁₅,

10 NR₁₀COR₁₁, NR₁₀COOR₉, NR₁₀CONR₁₂R₁₃, NR₁₀CN, OSiR₁₀R₁₁R₁₄, COR₁₀, CR₁₀OR₁₁OR₁₄, NR₉R₁₂R₁₃⁺, NO₂, CN, CO₂⁻, COOR₉, SO₃⁻, CONR₁₂R₁₃, SO₂R₁₀, SO₂NR₁₂R₁₃, SO₃R₉, PO₃⁻, PO(OR₁₀)(OR₁₁), SiR₁₀R₁₁R₁₄ and/or SiOR₁₀OR₁₁OR₁₄;

R₂ is OR₉, SR₉, NR₁₀R₁₅, NR₁₀COR₁₁, NR₁₀COOR₉, NR₁₀CONR₁₂R₁₃ or NR₁₀CN;

each R₉, independently of any other R₉, is R₁₅, COR₁₅, COOR₁₅, CONR₁₂R₁₃, CN or

15 a negative charge, preferably H or a negative charge;

R₁₀, R₁₁ and R₁₄ are each independently of the others hydrogen, C₁-C₁₂alkyl, C₂-C₁₂alkenyl, C₂-C₁₂alkynyl, [C₂-C₈alkylene-O-]_k-R₁₆, [C₂-C₈alkylene-NR₁₇]_k-R₁₆ or C₇-C₁₂aralkyl, it being possible for R₁₀ in NR₁₀R₁₅, NR₁₀COR₁₁, NR₁₀COOR₉, NR₁₀CONR₁₂R₁₃ or NR₁₀CN additionally to be a delocalisable negative charge;

20 R₁₂, R₁₃ and R₁₅ are each independently of the others H; C₁-C₁₂alkyl, C₂-C₁₂alkenyl, C₂-C₁₂alkynyl, C₃-C₁₂cycloalkyl, C₃-C₁₂cycloalkenyl or C₃-C₁₂heterocycloalkyl each unsubstituted or mono- or poly-substituted by halogen, OR₁₀, SR₁₀, NR₁₀COR₁₁, NR₁₀COOR₁₁, NR₁₀CONR₁₁R₁₄, OSiR₁₀R₁₁R₁₄, COR₁₀, CR₁₀OR₁₁OR₁₄, NR₁₀R₁₁R₁₄⁺, NO₂, CN, CO₂⁻, COOR₁₀, SO₃⁻, CONR₁₁R₁₄, SO₂NR₁₁R₁₄, SO₂R₁₀,

25 NR₁₁R₁₄ and/or SO₃R₁₀; or C₇-C₁₂aralkyl, C₆-C₁₀aryl or C₅-C₉heteroaryl each unsubstituted or mono- or poly-substituted by R₁₀, halogen, OR₁₀, SR₁₀, NR₁₀COR₁₁, NR₁₀COOR₁₁, NR₁₀CONR₁₁R₁₄, OSiR₁₀R₁₁R₁₄, COR₁₀, CR₁₀OR₁₁OR₁₄, NR₁₀R₁₁R₁₄⁺, NO₂, CN, CO₂⁻, COOR₁₄, SO₃⁻, CONR₁₁R₁₄, SO₂R₁₀, SO₂NR₁₁R₁₄,

- 62 -

SO_3R_{10} , PO_3^- , $\text{PO}(\text{OR}_{10})(\text{OR}_{11})$, $\text{NR}_{11}\text{R}_{14}$, $\text{SiR}_{10}\text{R}_{11}\text{R}_{14}$ and/or $\text{SiOR}_{10}\text{OR}_{11}\text{OR}_{14}$;

or $\text{NR}_{12}\text{R}_{13}$, $\text{NR}_{11}\text{R}_{14}$ or $\text{NR}_{10}\text{R}_{15}$ is a five- or six-membered heterocycle which may contain a further N or O atom and which can be mono- or poly-substituted by $\text{C}_1\text{-C}_8\text{alkyl}$;

5 R_{16} and R_{17} are each independently of the other mono- or poly-substituted $\text{C}_1\text{-C}_{12}\text{alkyl}$, $\text{C}_2\text{-C}_{12}\text{alkenyl}$, $\text{C}_2\text{-C}_{12}\text{alkynyl}$, $\text{C}_3\text{-C}_{12}\text{cycloalkyl}$, $\text{C}_3\text{-C}_{12}\text{cycloalkenyl}$, $\text{C}_3\text{-C}_{12}\text{heterocycloalkyl}$, $\text{C}_7\text{-C}_{12}\text{aralkyl}$, $\text{C}_6\text{-C}_{10}\text{aryl}$ or $\text{C}_5\text{-C}_9\text{heteroaryl}$;

M' is a transition metal cation having r positive charges;

A^{m-} is an inorganic, organic or organometallic anion, or a mixture thereof;

10 Z^{n+} is a proton, a metal, ammonium or phosphonium cation, a positively charged organic or organometallic chromophore, or a mixture thereof;

it being possible once or more times radicals of the same or different ligands L_1 , L_2 , L_3 and/or L_4 , each selected from the group consisting of R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , R_7 , R_8 , R_9 , R_{10} , R_{11} , R_{12} , R_{14} , R_{15} and R_{16} , to be bonded to one another in pairs by way

15 of a direct bond or an $-\text{O}-$, $-\text{S}-$ or $-\text{N}(\text{R}_{17})-$ bridge, and/or for from 0 to p anions A^{m-} and/or from 0 to q cations Z^{n+} each to be bonded to any radical R_1 , R_2 , R_3 , R_4 , R_5 , R_6 , R_7 , R_8 , R_9 , R_{10} , R_{11} , R_{12} , R_{13} , R_{14} , R_{15} , R_{16} or R_{17} of the same or different ligands L_1 , L_2 , L_3 and/or L_4 or to M' by way of a direct bond or an $-\text{O}-$, $-\text{S}-$ or $-\text{N}(\text{R}_{17})-$ bridge;

k is an integer from 1 to 6;

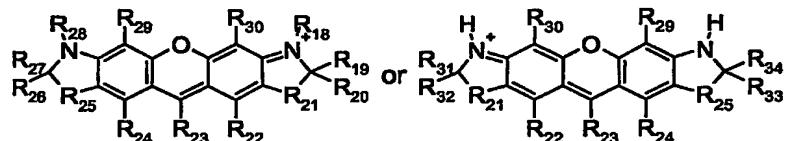
20 m , n and r are each independently of the others an integer from 1 to 4; preferably m and n are 1 or 2 and r is 2 or 3; and

o , p and q are each a number from 0 to 4, the ratio of o , p and q to one another, according to the charge of the associated sub-structures, being such that in formula (I), (II) or (III) there is no resulting excess positive or negative charge;

25 and with the further proviso that when R_1 , R_3 , R_4 , R_5 , R_7 and R_8 are all H, R_2 is OH,

- 63 -

R_6 is NO_2 , M is Co and r is 3, $[Z^{n+}]_q$ does not have the formula



wherein R_{18} and R_{28} are each independently of the other hydrogen; $C_1\text{-}C_{24}$ alkyl, $C_2\text{-}C_{24}$ alkenyl, $C_2\text{-}C_{24}$ alkynyl, $C_3\text{-}C_{24}$ cycloalkyl, $C_3\text{-}C_{24}$ cycloalkenyl or $C_3\text{-}C_{12}$ hetero-
5 cycloalkyl each unsubstituted or mono- or polysubstituted by halogen, NO_2 , CN , $\text{NR}_{35}\text{R}_{36}$, $\text{NR}_{35}\text{R}_{36}\text{R}_{37}^+$, $\text{NR}_{35}\text{COR}_{36}$, $\text{NR}_{35}\text{CONR}_{35}\text{R}_{36}$, OR_{35} , SR_{35} , COO^- , COOH , COOR_{35} , CHO , $\text{CR}_{37}\text{OR}_{35}\text{OR}_{36}$, COR_{35} , SO_2R_{35} , SO_3^- , SO_3H , SO_3R_{35} or $\text{OSiR}_{37}\text{R}_{38}\text{R}_{39}$; or $C_7\text{-}C_{18}$ aralkyl, $C_6\text{-}C_{14}$ aryl or $C_4\text{-}C_{12}$ heteroaryl each unsubstituted or mono- or poly-substituted by halogen, NO_2 , CN , $\text{NR}_{35}\text{R}_{36}$, $\text{NR}_{35}\text{R}_{36}\text{R}_{37}^+$,
10 $\text{NR}_{35}\text{COR}_{36}$, $\text{NR}_{37}\text{CONR}_{35}\text{R}_{36}$, R_{35} , OR_{35} , SR_{35} , CHO , $\text{CR}_{37}\text{OR}_{35}\text{OR}_{36}$, COR_{35} , SO_2R_{35} , SO_3^- , SO_3R_{35} , $\text{SO}_2\text{NR}_{35}\text{R}_{36}$, COO^- , COOR_{35} , $\text{CONR}_{35}\text{R}_{36}$, PO_3^- , $\text{PO}(\text{OR}_{35})(\text{OR}_{36})$, $\text{SiR}_{37}\text{R}_{38}\text{R}_{39}$, $\text{OSiR}_{37}\text{R}_{38}\text{R}_{39}$ or $\text{SiOR}_{37}\text{OR}_{38}\text{OR}_{39}$; but R_{18} and R_{28} are not simultaneously hydrogen;

15 R_{19} , R_{20} , R_{26} and R_{27} are each independently of the others $C_1\text{-}C_{12}$ alkyl unsubstituted or mono- or poly-substituted by halogen, OR_{37} , SR_{37} , NO_2 , CN , $\text{NR}_{40}\text{R}_{41}$, COO^- , COOH , COOR_{37} , SO_3^- , SO_3H or SO_3R_{37} , it being possible for R_{19} and R_{20} and/or R_{26} and R_{27} and/or R_{31} and R_{32} and/or R_{33} and R_{34} to be so bonded to one another in pairs by way of a direct bond or an -O- , -S- or $\text{-NR}_{42}-$ bridge that together they form a 5- to 12-membered ring;
20 R_{21} and R_{25} are each independently of the other $C_1\text{-}C_3$ alkylene or $C_1\text{-}C_3$ alkenylene each unsubstituted or mono- or poly-substituted by halogen, R_{42} , OR_{42} , SR_{42} , NO_2 , CN , $\text{NR}_{43}\text{R}_{44}$, COO^- , COOH , COOR_{42} , SO_3^- , SO_3H or SO_3R_{42} ; R_{22} , R_{24} , R_{29} and R_{30} are each independently of the others hydrogen, halogen, OR_{45} , SR_{45} , NO_2 , $\text{NR}_{45}\text{R}_{48}$; or $C_1\text{-}C_{24}$ alkyl, $C_2\text{-}C_{24}$ alkenyl, $C_2\text{-}C_{24}$ alkynyl, $C_3\text{-}C_{24}$ -

- 64 -

cycloalkyl, C₃-C₂₄cycloalkenyl, C₃-C₁₂heterocycloalkyl or C₇-C₁₈aralkyl each unsubstituted or mono- or poly-substituted by halogen, OR₄₅, SR₄₅, NO₂, CN or NR₄₅R₄₈;

R₂₃ is hydrogen; (CH₂)_kCOO⁻, (CH₂)_kCOOR₄₇, C₁-C₂₄alkyl, C₂-C₂₄alkenyl, C₂-C₂₄-alkynyl, C₃-C₂₄cycloalkyl or C₃-C₂₄cycloalkenyl each unsubstituted or mono- or poly-substituted by halogen, NR₄₇R₄₈ or OR₄₈; or C₇-C₁₈aralkyl, C₆-C₁₄aryl or C₅-C₁₃heteroaryl each unsubstituted or mono- or poly-substituted by halogen, NO₂, CN, NR₄₇R₄₈, SO₃⁻, SO₃R₄₇, SO₂NR₄₇R₄₈, COO⁻, (CH₂)_kOR₄₇, (CH₂)_kOCOR₄₇, COOR₄₇, CONR₄₇R₄₈, OR₄₇, SR₄₇, PO₃⁻, PO(OR₄₇)(OR₄₈) or SiR₃₇R₃₈R₃₉;

10 R₃₁, R₃₂, R₃₃ and R₃₄ are each independently of the others C₁-C₁₂alkyl unsubstituted or mono- or poly-substituted by halogen, OR₃₅, SR₃₅, NO₂, CN, NR₄₀R₄₁, COOR₃₇, SO₃⁻, SO₃H or SO₃R₃₅;

R₃₅, R₃₆, R₄₀, R₄₁, R₄₂, R₄₃, R₄₄, R₄₅, R₄₆, R₄₇ and R₄₈ are each independently of the others hydrogen; C₁-C₂₄alkyl, C₂-C₂₄alkenyl, C₂-C₂₄alkynyl, C₃-C₂₄cycloalkyl, C₃-C₂₄cycloalkenyl or C₃-C₁₂heterocycloalkyl each unsubstituted or mono- or poly-substituted by halogen, NO₂, CN, NR₃₇R₃₈, NR₃₇R₃₈R₃₉⁺, NR₃₇COR₃₈, NR₃₇CONR₃₉R₃₉, OR₃₇, SR₃₇, COO⁻, COOH, COOR₃₇, CHO, CR₃₇OR₃₈OR₃₉, COR₃₇, SO₂R₃₇, SO₃⁻, SO₃H, SO₃R₃₇ or OSiR₃₇R₃₈R₃₉; or C₇-C₁₈aralkyl, C₆-C₁₄aryl or C₅-C₁₃heteroaryl each unsubstituted or mono- or poly-substituted by halogen, NO₂, CN, NR₃₇R₃₈, NR₃₇R₃₈R₃₉⁺, NR₃₇COR₃₈, NR₃₇CONR₃₉R₃₉, R₃₇, OR₃₇, SR₃₇, CHO, CR₃₇OR₃₈OR₃₉, COR₃₇, SO₂R₃₇, SO₃⁻, SO₃H, SO₃R₃₇ or OSiR₃₇R₃₈R₃₉; or C₇-C₁₈aralkyl, C₆-C₁₄aryl or C₅-C₁₃heteroaryl each unsubstituted or mono- or poly-substituted by halogen, NO₂, CN, NR₃₇R₃₈, NR₃₇R₃₈R₃₉⁺, NR₃₇COR₃₈, NR₃₇CONR₃₉R₃₉, R₃₇, OR₃₇, SR₃₇, CHO, CR₃₇OR₃₈OR₃₉, COR₃₇, SO₂R₃₇, SO₃⁻, SO₃H, SO₃R₃₇ or OSiR₃₇R₃₈R₃₉; or SiOR₃₇OR₃₈OR₃₉;

25 or NR₃₅R₃₆, NR₄₀R₄₁, NR₄₃R₄₄, NR₄₅R₄₆ or NR₄₇R₄₈ are a five- or six-membered heterocycle which may contain a further N or O atom and which can be mono- or poly-substituted by C₁-C₈alkyl;

R₃₇, R₃₈ and R₃₉ are each independently of the others hydrogen, C₁-C₂₀alkyl,

- 65 -

C₂-C₂₀alkenyl, C₂-C₂₀alkynyl or C₇-C₁₈aralkyl, it being possible for R₃₇ and R₃₈ to be bonded to one another by way of a direct bond or an -O-, -S- or -NC₁-C₈alkyl-bridge so that together they form a five- or six-membered ring;

it being possible for from 1 to 4 radicals selected from the group consisting of R₁₈,

5 R₁₉, R₂₁, R₂₂, R₂₃, R₂₄, R₂₅, R₂₆, R₂₈, R₂₉, R₃₀, R₃₅, R₃₆, R₃₇, R₃₈, R₃₉, R₄₀, R₄₁, R₄₂, R₄₃, R₄₄, R₄₅, R₄₆, R₄₇ and R₄₈ to be bonded to one another in pairs by way of a direct bond or an -O-, -S- or -N(G)- bridge or bonded singly to A^{m-} and/or Zⁿ⁺, wherein G is mono- or poly-substituted C₁-C₂₄alkyl, C₂-C₂₄alkenyl, C₂-C₂₄alkynyl, C₃-C₂₄cycloalkyl, C₃-C₂₄cycloalkenyl, C₃-C₁₂heterocycloalkyl, C₇-C₁₈aralkyl,

10 C₆-C₁₄aryl or C₅-C₁₃heteroaryl.

2. An optical recording medium according to claim 1, wherein R₂ and R₄ are hydroxy, O⁻, mercapto or S⁻ and R₆ or R₇ is nitro or cyano; Zⁿ⁺ is a xanthene; and/or R₁₀ is methyl, ethyl, n-propyl, isopropyl, n-butyl, 2-butyl, isobutyl, tert-butyl, 3-pentyl, n-amyl, tert-amyl, neopentyl, 2,2-dimethyl-but-4-yl, 2,2,4-trimethyl-pent-5-

15 yl, cyclopropyl, cyclopropylmethyl, cyclobutyl, cyclobutylmethyl, cyclopentyl, cyclopentylmethyl, cyclohexyl, cyclohexylmethyl, cyclohex-4-enyl-methyl, 5-methyl-cyclohex-4-enyl-methyl or 2-ethyl-hexyl, each unsubstituted or mono- or poly-substituted by fluorine.

3. An optical recording medium according to claim 1 or 2, wherein M^{r+} is Co²⁺, Co³⁺,

20 Cu⁺, Cu²⁺, Zn²⁺, Cr³⁺, Ni²⁺, Fe²⁺, Fe³⁺, Al³⁺, Ce²⁺, Ce³⁺, Mn²⁺, Mn³⁺, Si⁴⁺, Ti⁴⁺, V³⁺, V⁵⁺ or Zr⁴⁺.

4. An optical recording medium according to claim 1, 2 or 3, additionally comprising a cyanine or xanthene cation, preferably a benzoindocarbocyanine or rhodamine cation.

25 5. A method for the optical recording, storage or playback of information, wherein a recording medium according to claim 1, 2, 3 or 4 is used.

6. A method according to claim 5, wherein the recording and/or the playback take

- 66 -

place in a wavelength range of from 600 to 700 nm, preferably from 630 to 690 nm, more especially from 640 to 680 nm, very especially from 650 to 670 nm, particularly at 658 ± 5 nm.

7. A method of producing an optical recording medium, wherein a solution of a compound of formula (I), (II) or (III) according to claim 1, 2 or 3 in an organic solvent is applied to a substrate having depressions
8. A method for the optical recording, storage or playback of information, wherein a recording medium according to claim 1, 2 or 3 is used
9. A method according to claim 8, wherein the recording and/or the playback take place in a wavelength range of from 600 to 700 nm.
10. A compound of formula (II) or (III) according to claim 1, 2 or 3 or a tautomeric or mesomeric form thereof wherein R₂ is O⁻, S⁻, N⁻COR₁₁, N⁻COOR₉, N⁻CONR₁₂R₁₃ or N⁻CN.